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Abstract

HEAVY WATER MODERATED GAS-COOLED REACTORS

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France has based its main effort for the production of nuclear energy on natural Uranium Graphite-moderated gas-cooled reactors, and has a long term programme for fast reactors, but this country is also engaged in the development of heavy water moderated gas-cooled reactors which appear to present the best middle term prospects. The economy of these reactors, as in the case of Graphite, arises from the use of natural or very slightly enriched Uranium ; heavy water can take the best advantages of this fuel cycle and moreover offers considerable development potential because of better reactor performances. A prototype plant EL 4 (70 MW) is under construction and is described in detail in another paper. The present one deals with the programme devoted to the development of this reactor type in France.

Reasons for selecting this reactor type are given in the first part : advantages and difficulties are underlined. After reviewing the main technological problems and the Research and Development carried out, results already obtained and points still to be confirmed are reported.

The construction of EL 4 is an important step of this programme : it will be a significant demonstration of reactor performances and will afford many experimentation opportunities. Now the design of large power reactors is

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to be considered. Extension and improvements of the mechanical structures used for EL 4 are under study, as well as alternative concepts.

The paper gives some data for a large reactor in the present state of technology, as a result from optimization studies. Technical improvements, especially in the field of materials could lead to even more interesting performances. Some prospects are mentioned for the long run. Investment costs and fuel cycles are discussed in the last part.